Viet Nam's rapid growth: at what environmental costs?

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1. Introduction

Located in Southeast Asia, Viet Nam has an area of 329,560 sq km and a population of 85 million. Viet Nam's Gross Domestic Product (GDP) increased at an average rate of about seven per cent per year in the period of 1997-2006. This makes Viet Nam one of the fastest growing economies in the region. Industrial production remains strong and investment solid. To attain a goal of having 'rich people, strong country and a just, democratic and civilised society', maintaining high economic growth rate is a key task set by the Government of Viet Nam (Viet Nam Political Bureau 2004).

However, parallel with economic growth, Viet Nam is facing environmental problems. These include deforestation, degradation in environmental quality in river basins, increase in municipal and industrial solid waste and soil erosion (Viet Nam Political Bureau 2004). Most industrial and municipal wastewaters are discharged untreated to rivers and that worsens surface water pollution. Municipal solid waste has increased at 15 per cent per annum while the capacity to collect and treat remains limited. About 50 per cent of land is losing its fertility due to overuse of chemical fertilisers, pesticides and improper cultivation practices (Viet Nam Political Bureau 2004).

This paper analyses the stress placed on the country's environment resulting from the fast growth. The stress includes high population growth, rapid urbanisation, increased need for transport network expansion and exploitation of natural resources. The paper then analyses consequent environmental problems including air pollution, water pollution, solid waste and biodiversity loss. After reviewing policy responses to environmental problems as well as shortcomings of the policy responses, the paper provides a set of recommendations for the policymakers for their consideration. In this paper, it is argued that rapid growth has created serious environmental problems and that more effective policy responses are needed to tackle the problems.

2. Pressure on the environment

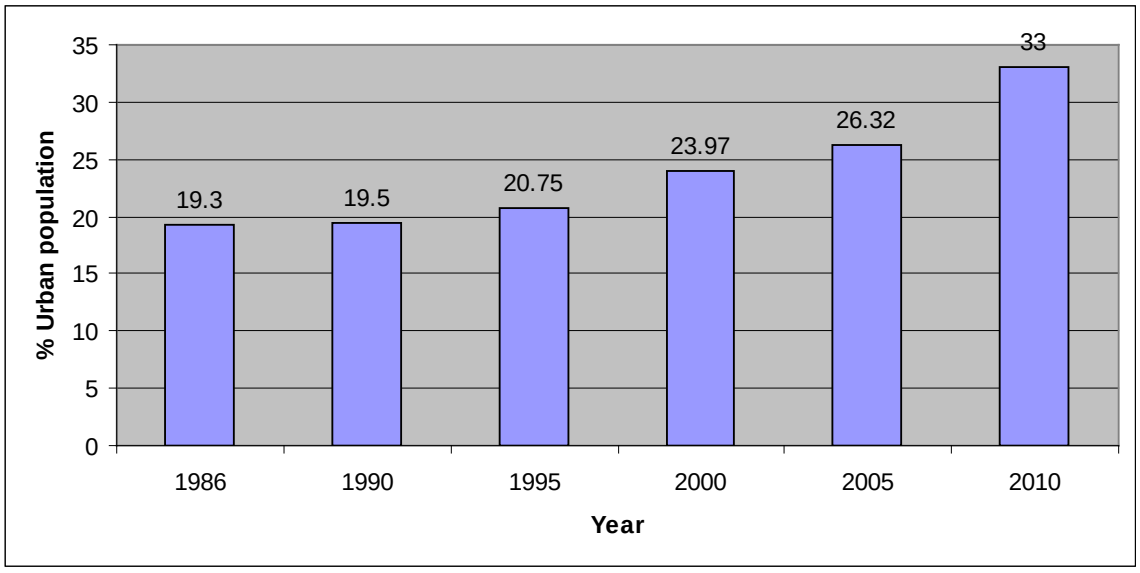
The environment has suffered from great pressure of several growth factors, including population growth and urbanisation, increased transport activities, expanded industry and construction activities and exploitation of natural resources.

2.1 Population growth and urbanisation

With the population of 85 million people, Viet Nam is the third in Southeast Asia and 14th in the world. The population annual growth rate is 1.7 per cent. The distribution of the population is uneven. The Mekong River Delta and Red River Delta account for only 17 per cent of the land, but are habitat for 43 per cent of the population. The uneven population density is due to uncontrolled migration from rural to urban areas. The migration from rural to urban areas is three times higher than the migration from urban to rural areas. For example, from 1994 to 1999, about 1.2 million people migrated from rural to urban areas, whereas only 0.4 million people moved from urban to rural areas (MONRE 2005a).

Associated with population growth is urbanisation. Over the last two decades, urbanisation has occurred rapidly. In 1990, there were 500 urban towns. This number increased to 650 in 2000 and 700 in 2004 (MONRE 2005b). The urban population growth rate also increases steadily. In 1986, 19.3 per cent of the population (or about 12 million people) lived in urban areas. In 2005, the percentage of the population living in urban areas increased to 26.32 per cent. It is projected that urban population will be 30.4 million people or 33 per cent of the whole population in 2010 (Figure 1).

Figure 1 Urban population trend 1986-2010



Source: MONRE 2007

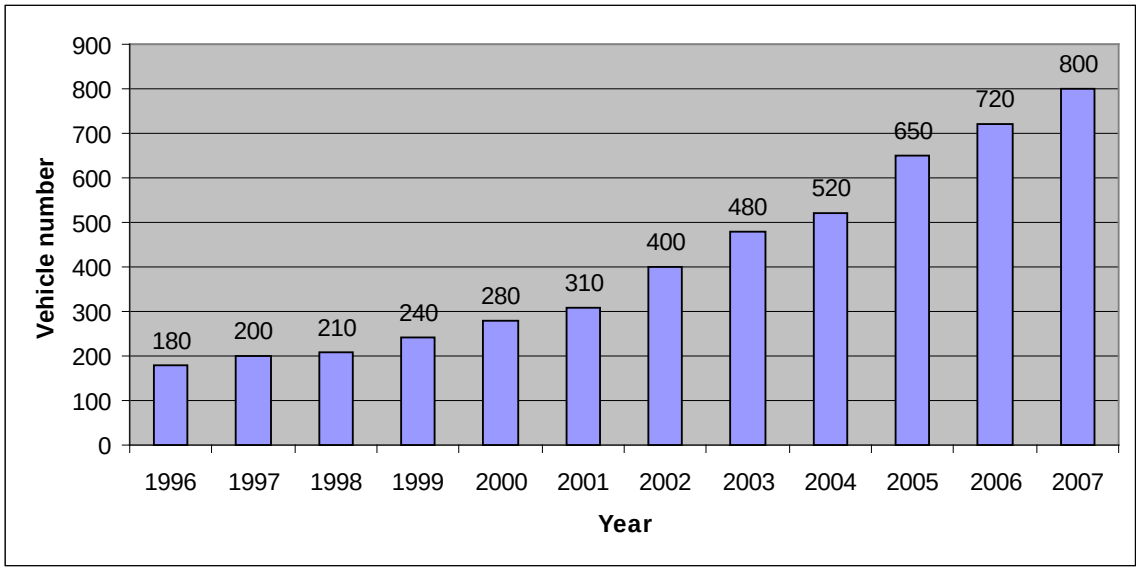
The rapid urbanisation has placed great pressure on the environment. The infrastructure is inadequate to accommodate the population, resulting in increased traffic jams (MONRE 2007). In addition, as environmental protection has not been integrated into urban planning, many industrial factories are now in the middle of residential areas. For example, Ho Chi Minh City has about 700 factories, of which 500 are located in residential areas. Ha Noi has 300 factories, of which 200 are located in residential areas. The area of trees has decreased. The area of soil has been replaced by concretes. This, together with poor drainage systems, has led to flooding in some urban areas in the rainy season. Sanitation conditions in some areas have decreased due to overcrowded population.

2.2 Increased transport activities

Together with industrialisation and urbanisation, the number of vehicles has rapidly increased, especially in urban areas. Before 1980, about 90 per cent of the population used bicycle. Nowadays, about 80 per cent of urban population used motorbikes and cars. Each year, the numbers of motorbikes and cars increases 15 per cent and 10 per cent

respectively (MONRE 2007). Figure 2 shows the increased number of registered vehicles in the period 1996-2007.

Figure 2 The number of registered vehicles 1986-2007



Source: MONRE 2007

The growth rate of vehicles is much lower than that of infrastructure. The infrastructure only met 35 per cent of the transport demand (MONRE 2005b). This is due to the fact that the space for transports in urban areas in Viet Nam remains as low as 10 per cent whereas that in developed countries is about 20-25 per cent (MONRE 2007). In addition, public transports have not been adequate. Public transports have met only 5 per cent of the demand. As a result, about 70 per cent of population uses individual vehicles. This worsens traffic jams in many urban areas. Consequently, emission has become the main air pollution source in urban areas. Seventy per cent of air pollution in urban areas is due to vehicles (MONRE 2005b).

Another cause of air pollution is poor conditions of vehicles and the use of high sulphur fuel. Many of the vehicles are old and hence consume fuel inefficiently. As a result, they produce a large amount of emission and create considerable noise (MONRE 2007). In

addition, up to 1 July 2007, most vehicles still use diesel fuel with of a sulphur level being more than 0.25 per cent, as opposed to the recommended level of 0.05 per cent. As a result, SO_2 pollution remains problematic in some traffic intersections.

2.3 Expanded industry and construction activities

The number of industrial zones has rapidly increased over the last decade. In 1995, there were 12 industrial zones. In 2007, the number of industrial zones reached 150 (MONRE 2007). Old industries, which were built before 1975, have old production technologies and are the main cause of pollution. Most of the old industries do not have equipment for treating emission and effluents. In general, the old industries do not meet the standards of environmental quality.

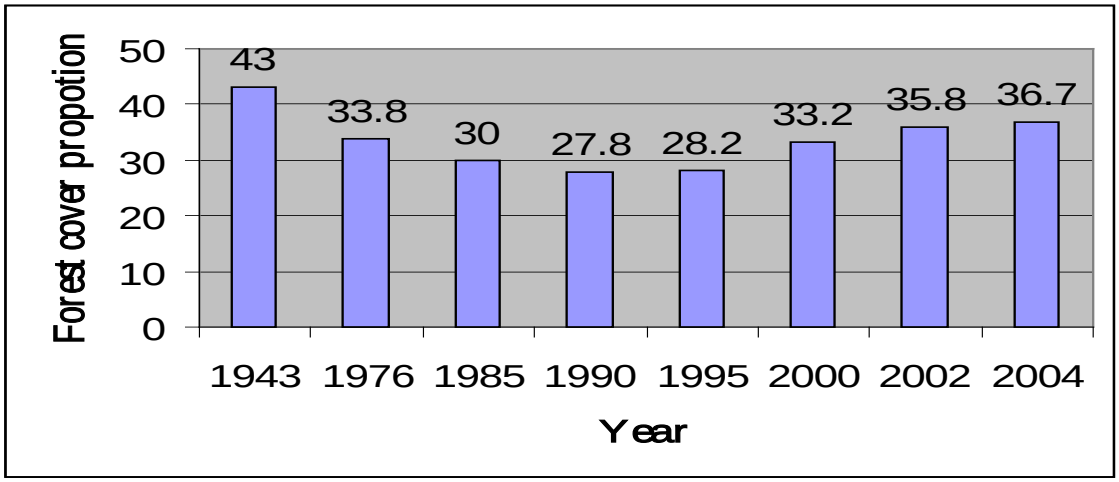
Another pollution source comes from construction activities. House, road, bridge construction activities are taking place everywhere, particularly in the urban centers. Activities such as digging up of soil, demolition of old buildings, and building materials dropping during transportation generate serious dust pollution. Monitoring results show that 70 per cent of dust volume in urban air is from construction activities (MONRE 2007).

2.4 Exploitation of natural resources

The country faces a severe deforestation. From 1945 to 1983, forest cover decreased from 44 to 33 per cent. In the following decade, the forest area rapidly decreased to only 28 per cent in 1995. Due to recent effort by the government in reforestation, forest cover has recovered since 1995 (Figure 3). However, it should be noted that although forest cover has slightly increased in recent years, the quality of forest remains poor (MONRE 2005a). The majority of forests is newly planted forests, which do not provide as much biodiversity as the old growth forests.

Another pressure on natural resources comes from the fact that about 70 per cent of population lives on biodiversity resources (MONRE 2005a). Importantly, the practice of exploiting the resources is unsustainable. For example, damaging fishing methods such as using dynamites and electrical gears are still common. Illegal logging remains a big threat to forest biodiversity. In a month, up to 275 illegal logging cases and 1523 illegal timber trade cases have been found. Animal trafficking remains common. Fifty five animals and 40 reptile species have been found illegally traded. These have led to degradation of natural resources and biodiversity losses.

Figure 3 Forest cover in the period 1943-2004



Source: MONRE 2005a

The pressure from population growth, urbanisation, industry and transport activities and natural resource overexploitation has resulted in environmental problems.

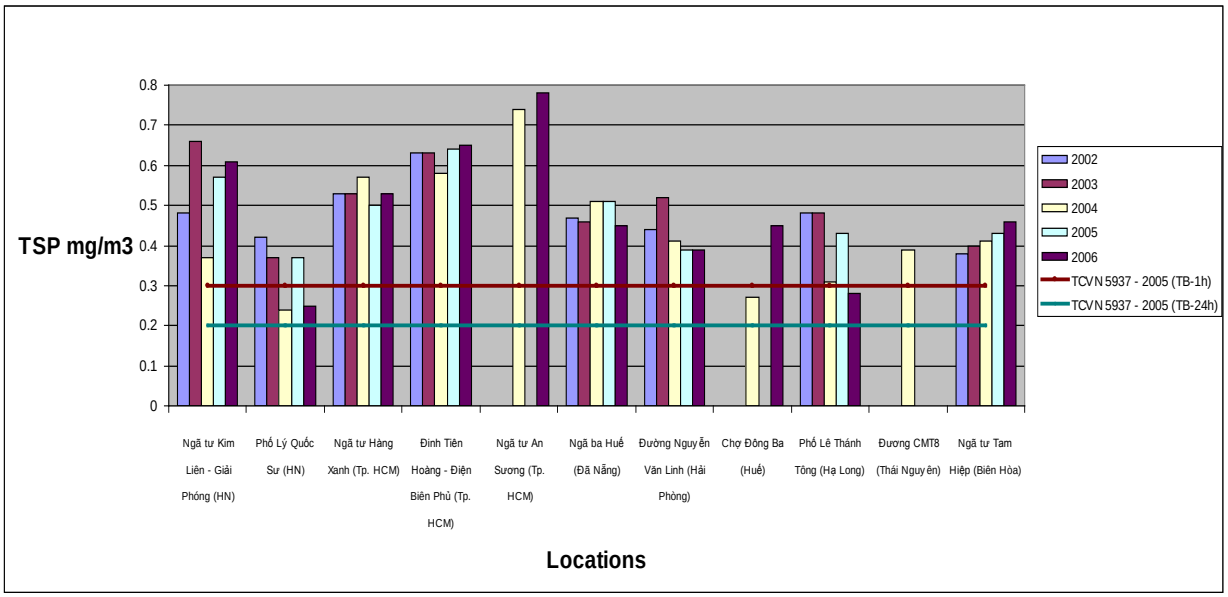
3. Environmental problems

The most serious environmental problems are air pollution, water pollution, solid waste and biodiversity loss.

3.1 Air pollution

The faster the process of industrialisation and urbanisation, the more serious is the problem of air environment pollution and decline in air quality. Dust is the most air pollutant in Viet Nam. Results from environmental monitoring stations from 1995 to 2006 show that most urban areas in Viet Nam are polluted by dust, with some centres are polluted at an alarming degree. According to Viet Nam Environment Standards (TCVN) 5937- 1995, a permitted standard of a daily average suspended dust concentration is 0.2 mg/m^3 and a permitted standard of an hourly average suspended dust concentration is 0.3 mg/m^3. However, in residential areas next to factories or near large traffic roads, dust concentrations are often from 1.3 to threefold higher these acceptable levels (Figure 4). The places with highest levels of dust pollution are residential areas near industrial areas (MONRE 2007). Other pollutants include SO_2, NO_2 and CO. However, SO_2, NO_2 and CO pollution is only found in some points and not a common air pollution problem yet.

Figure 4 Dust concentrations in urban areas in the period 2002-2006



Source: MONRE 2007

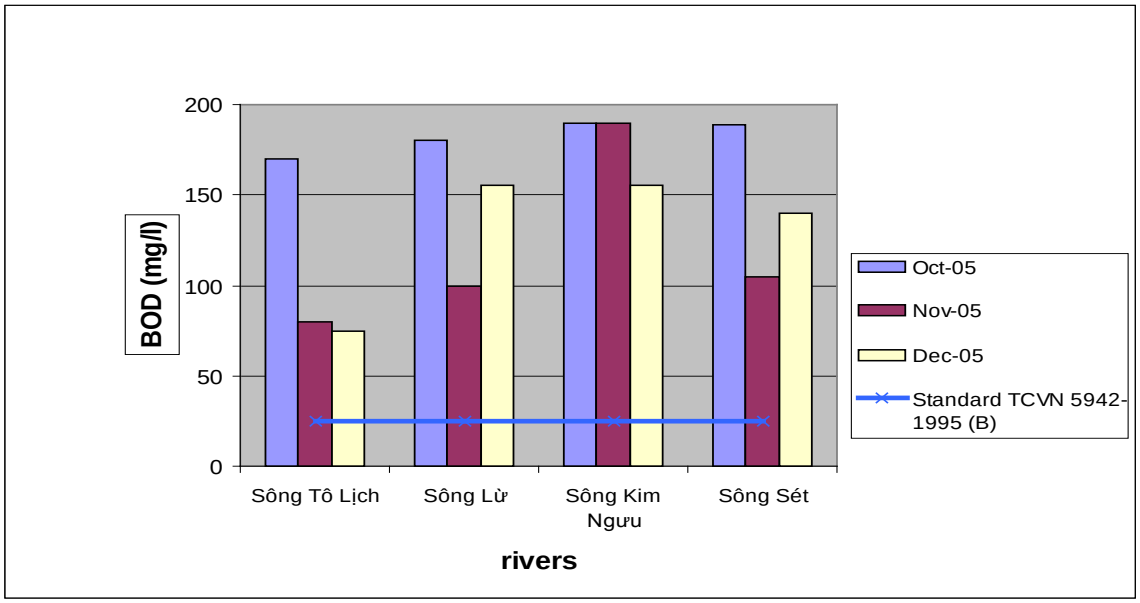
Another air problem is noise pollution. Noise pollution is found along main roads. In these places, noise levels usually are from 1 to15 dBA higher than a permitted level of 75 dBA (MONRE 2005b). Noise pollution comes from not only a large number of vehicles but also the bad habits of overusing horns by vehicle drivers. Driving in crowded roads with so many kinds of vehicles including trucks, cars, motorbikes, bicycles to pedestrians, and few traffic rule abiders, drivers tend to use horns too often to secure their traffic.

Air pollution has resulted in damage to human health, agriculture and buildings. Many health problems such as respiratory and cardiovascular diseases are associated with air pollution. People living in the air polluted areas suffer more from the diseases than those living in rural areas. For example, the morbidity rate of bronchitis in urban area of Ha Noi is 2.9 times higher than that in rural area of Ha Noi (MONRE 2007). In addition, air pollution has hampered the crop productivity in adjacent agricultural areas. The acid rain problems have caused erosions of building. Estimated air pollution damage is about 5.5 per cent of GDP (MONRE 2007).

3.2 Water pollution

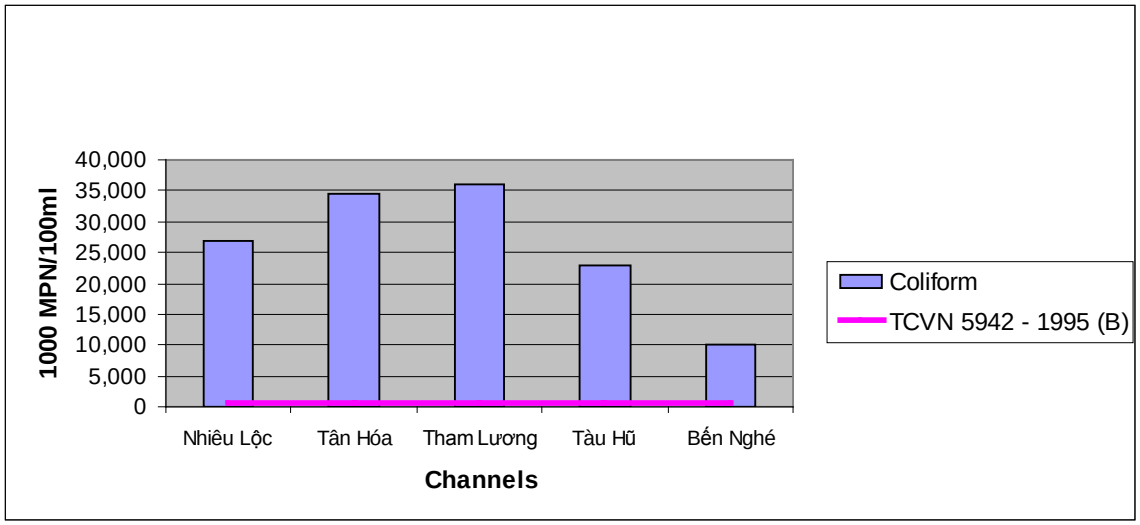
Water pollution is another serious environmental problem. Despite a large population and hence a large amount of wastewater generated, there are few municipal wastewater treatment facilities. The majority of municipal wastewater is untreated and directly discharged into lakes and rivers. Similarly, the majority of industrial wastewater is untreated before being discharged into the environment. Only five per cent of industrial wastewater is treated (MONRE 2005b). As a result, surface water in downstream of rivers running through residential and industrial areas have been increasingly polluted (MONRE 2005b). Pollutants such as TSS, BOD_5 and $N\text{-}NH_4$ are all about 1.5 to 3 times higher than permitted levels. Notably, BOD_5 in all rivers in Ha Noi is 2- 5 times higher than permitted levels (Figure 5) and coliform in main channels in Ho Chi Minh City is several thousands of times higher than standards (Figure 6).

Figure 5 Water pollution in rivers in Ha Noi



Source: MONRE 2005b

Figure 6 Water pollution in main channels in Ho Chi Minh City



Source: MONRE 2005b

Water pollution is worsened by leachate from open dumps and medical waste. Most of the 1,000 hospitals all over the country fail to have wastewater treatment facilities. Each hospital discharges hundreds of cubic meter of untreated wastewater into the environment a day. The medical wastewater carries a lot of germs and bacteria which are the main threat to public health. Untreated medical wastewater, industrial wastewater and municipal wastewater are combined in municipal sewage system and then discharged to channels and rivers. On average, there are 3.1 million cu m of municipal, industrial and medical wastewater discharged into the environment per day.

While air pollution is mainly an urban environmental problem, water pollution is found in rural areas as well. The main reason for water pollution in rural areas is pesticide and fertiliser residuals. Due to poor cropping practices, pesticides and fertilisers are often over used. Consequently, run-off through crop fields forms considerable non-point source pollution. Water pollution is worsened in industrial villages. Most of the 1,450 industrial villages nationwide do not have wastewater treatment facilities and discharge untreated wastewater directly into the environment.

Water pollution has led to negative health impact. Among environmental health problems, waterborne and sanitation related diseases are a major problem in Viet Nam (UNICEF 2007). Due to water pollution and contamination of water supply sources, diarrhoea is one of the leading causes of morbidity nationwide, with some 250,000 hospitalisations a year. Up to 44 percent of Vietnamese children are infected with worms. With 9,400 deaths per year and the Disease-Adjusted Life Year (DALY)[1] of four per 1,000 people per year being attributed to unsafe water and poor sanitation, these problems are the highest risk factors of the environmental burden of diseases in Viet Nam (WHO 2007).

[1] Disease-Adjusted Life Year (DALY) is a commonly used method to measure a health gap. One DALY can be thought of as one lost year of healthy life and the burden of disease as a measure of the gap between current health status and an ideal situation where everyone lives into old age free from disease and disability (WHO 2007).

3.3 Solid waste

Together with increased population and industrialisation in increased solid waste generation. Using an Input-Output model, Triet (2005) estimated that associated with VND 1 billion GDP was 44.4 tonnes of solid waste. Average municipal solid waste generation rates in urban and rural areas are 1.1 and 0.6 kg per head per day respectively (MONRE 2005b). This means everyday, several thousands of hundreds of tonnes of solid waste is generated. Solid waste generation increases 15 per cent per year while collection capacity remains limited. Only about 70 per cent of solid waste is collected. Open dumping remains a common problem. In addition, waste segregation remains limited. As a result, industrial waste including hazardous waste is dumped with municipal waste. Furthermore, there are very few sanitary landfills. Among 82 landfills, only 8 landfills are sanitary ones (MONRE 2005b).

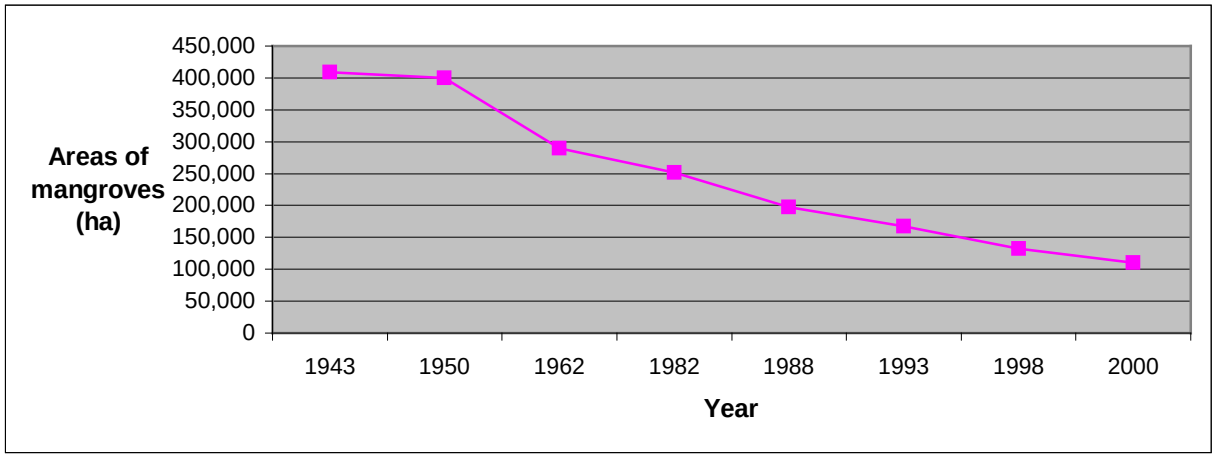
3.4 Biodiversity loss

Another serious environmental problem is biodiversity losses. Some wild animals have been completely lost. Some species are in danger of extinction, including tiger, one-horned rhinoceros, grey bull, golden deer, musk-deer, and white-neck crane. From 1996 to 2004, the number of endangered species increased from 226 to 259. The *Viet Nam's Red Book* published in 2005 shows that 365 species of rare animals and plants are in danger of extinction at different levels (MONRE 2005a).

Biodiversity loss also applies to aquatic and marine environment. Both quantity and quality of fish stock has degraded. Fish stock decreased 25 per cent from 1990 to 2003 (MONRE 2005a). The number of threatened fish species increased from 15 in 1989 to 135 in 1996. The establishment of artificial reservoirs has adversely affected the spawning grounds of fish that are used to migrating to upper reaches to give birth. Due to development activities and exploitation, the area of coral reef has decreased 30 per cent over the last two decades. Up to 50 per cent of coral reef is threatened and 17 is highly threatened.

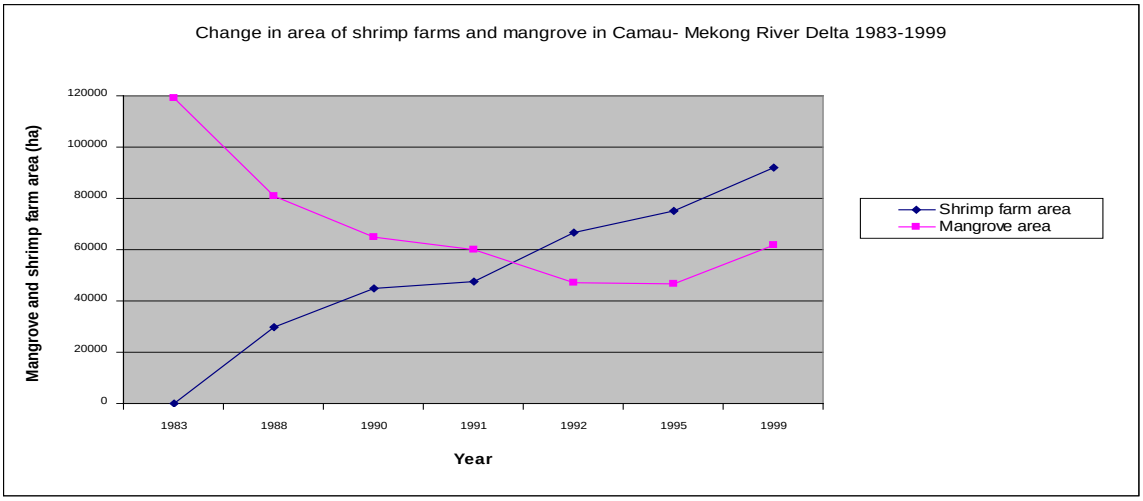
Wetlands in Viet Nam have experienced losses in scale and ecological integrity. The area of mangrove forest has decreased by about 80 per cent over the last 50 years (World Bank 2002:17). The area of mangroves decreased from 408,500 hectares in 1943 to 110,700 hectares in 2000 (MONRE 2002:32) (Figure 7). While some authors point out a number of different causes for the mangrove losses, the World Bank (2002:18) affirms that the increase in shrimp farming is the leading cause of this loss (Figure 8).

Figure 7 Decrease in mangrove areas in Viet Nam 1943-2000



Source: MONRE 2002.

Figure 8 Change in area of shrimp farms and mangrove in Ca Mau- Mekong River Delta 1983-1999



Source: MONRE 2005b

4 Policy responses

4.1 Achievements

A number of policy responses have been taken to address the nation's environmental problems. The Law on Environmental Protection was issued in 1993 and revised in 2005 to better address environmental issues in the period of industrialisation and modernisation. Other relevant legislation has been promulgated to address environmental protection in the development process. This includes the Law on Water Resources 1998, the Land Law 2003 and the Law on Forest Protection and Development 2004. A large number of regulations regarding environmental impact assessment, environmental monitoring and pollution control have also been issued to provide guidelines for the implementation of the laws.

In addition, environmental protection organisations have been established. In 1992, the Ministry of Science, Technology and Environment and the provincial Departments of Science, Technology and Environment were established to manage environmental protection at national and provincial levels respectively. In 2002, these organisations were restructured to form the Ministry of Natural Resources and Environment and the Departments of Natural Resources and Environment in all provinces to better address increasing demands for environmental protection. In addition, the participation of organisations such as those involving women, youth, trade and farmer unions has increased since 1993. These have strengthened environmental organisation systems at both national and grassroot levels.

Environmental policy instruments have been developed and applied. So far, command and control is the prevailing approach in environmental management in Viet Nam (Do 2008). The National Strategy for Environmental Protection 2001-2010 stresses the need for strengthening the institutional framework and legislation as the highest priority task.

In proposing solutions to environmental degradation, reviewing and revising legislation has been always ranked as the first task to be accomplished in all environmental programs (Do 2008).

Economic instruments have also been developed and applied. Wastewater fees have been put in use since 2003 (MONRE/MOI/WB 2007). Now emission charges are being considered by the government. Deposit-refund has been used to promote recycling, although it is on an ad hoc basis. Resource taxes have been applied for mining industries. Viet Nam Environmental Fund was established in 2003 to provide soft loans for investment in waste treatment technologies. Public disclosures have been applied in a small scale for some areas.

In addition, a significant increase in investment for environmental protection has been observed. In 2006, a separate category for environmental budget was established and since then at least one per cent of an annual state budget or around VND 150 billion has been allocated for this category. The policy responses have shown awareness of the government to environmental problems as well as its commitment to solving the problems. The most notable achievement of policy responses is that Viet Nam has developed a large number of legal documents and policy instruments in 15 years while this took some other developed countries such as Australia and the US some decades to develop (MONRE/MOI/WB 2007).

4.2 Shortcomings

However, several policy shortcomings remain unsolved. The first shortcoming is inadequate enforcement capacity, especially at local level. There are only about 150 staff members at the national level and 400 staff members at the local levels. That means there are only six environmental officers per one million people. Environmental management bodies have been in full operation only at the national and provincial levels. Although the Law stipulates that there shall be environmental officers at district and commune levels,

only half of the districts have environmental staff (MONRE 2005b). At the communal level, there are no environmental officers.

Particularly, human resources for enforcement are limited. The inspection service, which is in charge of environmental enforcement and compliance, faces a severe problem of staff shortage. With only 2 or 3 inspectors, each DONRE inspection division has to supervise compliance of the whole province not only in terms of environmental issues but also in terms of other issues such as land, housing, water resources and mining. At average, there are only 3 inspectors per million people (VEPA 2007). In addition, these inspectors have not been fully trained in environmental inspection. These prevent the inspection service from fulfilling their task of monitoring and enforcing environmental compliance. As a result, there remains considerable number of environmental violations.

One typical example of weak enforcement is the VEDAN violation case. VEDAN is a large scale Taiwanese mono sodium glutamate manufacturer located in Dong Nai province. Over the last 15 years, every day VEDAN has discharged 5,000 cu m untreated wastewater into the Thi Vai river via an illegal underground discharge pipes (*Tien Phong* 18 October 2008). All pollutants in VEDAN waste water are some hundreds of times higher than permitted levels. As a result, Thi Vai river, which receives waste water of the company, has been severely polluted. The river is now called a 'dead river' as it no longer provides ecological services. Instead, it is considered as a 'sewage system' of VEDAN and other manufacturers along Thi Vai river. The problem is the company has been inspected several times but only recently has its violation been detected. Local authorities believe that this shortcoming is due to a lack of both quantity and professional qualification of local inspectors (*Tien Phong* 18 October 2008).

The second problem is the failure of incorporating environmental consideration into socioeconomic planning. In some cases, particularly at the local level, economic growth is considered the most important target. Many projects were approved without having to carry out environmental impact assessment (EIA) and many fail to follow conditions on EIA approval set by environmental authorities (Can 2005). In addition, no environmental

audits have been conducted to secure compliance and effectiveness of EIA. This is because in EIA regulations, there is no requirement of environmental audits.

The third problem lies in weak cooperation among government authorities. Environmental decision making often involves many stakeholders including national and national environmental authorities and line ministries. On the one hand, this enables different stakeholders to contribute into the process. On the other hand, this makes it more difficult to assign properly and clearly tasks and responsibilities of each stakeholder. For example, in VEDAN case, when criticised by public media about not handling with the violation case for a long time, Dong Nai DONRE claimed that it is MONRE who issued a discharge permit for VEDAN, while MONRE reacted that MONRE's decision was based on record files screened and submitted by DONRE. The weak cooperation seems to be worsened when Dong Nai People's Committee says that it cannot follow MONRE direction of ceasing VEDAN operation due to local socioeconomic issues and administrative procedures involved (*Tien Phong* 18 October 2008).

The fourth problem is limited public awareness to environmental protection. Surveys show that when buying products, most of customers do not care about environmental performance of a manufacturer (VEPA 2007). This fails to provide demand for environmental protection. Many people think environmental protection is the task of government. Environmental protection usually is usually ranked as lowest priority for government funding (Do 2007).

The firth problem is a lack of economic instruments in environmental management. Although Viet Nam has made considerable progress in developing and implementing policy instruments, it still needs further proper management tools. Most notably are environmental valuation and public disclosure. With respect to environmental valuation, at present, there is no regulation explicitly requiring the implementation of environmental valuation (Do 2008). None of the key regulations such as the Political Bureau's Directive on Environmental Protection and the Amended Law on Environmental Protection 2005

specifies environmental valuation as a management tool. Because it is not mentioned in regulations, environmental valuation has not been given due attention by policymakers. Consequently, costs of environmental degradation as well as benefits of environmental improvement have not been quantified and properly considered in policymaking.

One example of the demand for environmental valuation is determining environmental and health damage caused by pollution. The increasing severity of pollution has triggered environmental regulators to find stricter regulatory instruments to stop the pollution. One of the instruments is the Criminal Law 1999. It has a section specifying that environmental polluters can be sued and treated as criminals if their violations result in serious environmental and health damage. However, without environmental valuation, it is hard to determine how serious the damage is. As a result, no environmental crime has been prosecuted despite the increase in the magnitude and extent of environmental violation cases (Truong 2007).

Regarding public disclosure, no specific regulation on this exists. Therefore, environmental authorities are sometimes reluctant to publicise the violation (Do and Phung 2001). Publicising contravention is a new approach to environmental management promoted by the World Bank. Research shows that it has considerably increased compliance rates in Indonesia, the Philippines and China (World Bank 2001). Results of a project on public disclosure in Viet Nam show that the publicising of contraventions could help increase compliance rate by 17 per cent (NEA 2002). Despite its potential benefits, public disclosure has not been recognised as an official management tool yet.

5 Conclusion and recommendations

Together with economic growth, Viet Nam is facing great pressure on the environment. The pressure comes from rapid population growth and urbanisation, increased transport activities, industry and construction expansion and overexploitation of natural resources.

Infrastructure is inadequate to accommodate the need of increased population and transportation. Most of manufacturers fail to have waste treatment facilities. Municipal waste water treatment facilities and sanitary landfills are limited. Natural resources are overexploited for local people livelihood. The consequences are severe pollution problems and biodiversity loss. Dust pollution is a severe problem of urban areas. Water is severely polluted in both urban and rural areas. Forest degradation continues and so does biodiversity losses.

Policy responses have been taken to solve environmental problems. Environmental law and regulations have been developed. In addition, governmental organisations have been established to implement the legislation and regulations. Various policy instruments have been developed and implemented. However, these policy responses are inadequate. The remaining problems are limited enforcement capacity, inadequate integration of environmental consideration into socioeconomic planning, weak cooperation among governmental agencies, limited public awareness and a lack of environmental economic instruments.

To better address environmental problems, it is recommended that the government takes the following actions:

- Increase the number of environmental inspectors and officials in charge of environmental protection, particularly at local levels, as well as improve their professional capacity.
- Strictly enforce environmental impact assessment regulations and impose regulatory requirements of environmental audits to ensure the implementation of commitment in environmental impact assessment
- Improve the division of tasks and responsibilities of governmental agencies
- Enhance public awareness on environmental protection to create demand for environmental protection
- Apply environmental valuation and public disclosure as official environmental management instruments.

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